AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of claims:

1. (Currently amended) A zoom lens to form an image of an object with variable magnification between a shortest focal length and a longest focal length, comprising:

a first lens group having a positive refracting power;

a second lens group positioned closer to the image than the first lens group and having a negative refracting power; and

a third lens group positioned closer to the image than the second lens group and having a positive refracting power;

wherein when the magnification is changed from the shortest focal length to the longest focal length, the third lens group is shifted toward the object and the first lens group and the second lens group are shifted in such a manner that a distance between the first lens group and the second lens group is increased and a distance between the second lens group and the third lens group is decreased,

wherein the third lens group comprises at least a single positive lens and at least a single negative lens,

wherein a variable magnification ratio of the zoom lens is four times or more[[.]], and

wherein the zoom lens satisfies the following formula:

$$2.9 < \beta_{3T}/\beta_{3W} < 8$$

wherein β_{3T} is a paraxial lateral magnification of the third lens group on the condition that the zoom lens is structured to effect the longest length, and

β_{3W} is a paraxial lateral magnification of the third lens group on the condition that the zoom lens is structured to effect the shortest focal length.

2. (Original) The zoom lens of claim 1, wherein the variable magnification ratio of the zoom lens is five times or more.

3. (Original) The zoom lens of claim 1, wherein the first lens group comprises at least a single positive lens and at least a single negative lens.

4. (Original) The zoom lens of claim 1, wherein the zoom lens satisfies the following formula:

$$4.5 < f_1/f_w < 20$$

where f_1 is a focal length of the first lens group, and

f_w is the shortest focal length of the zoom lens.

5. (Canceled) The zoom lens of claim 1, wherein the zoom lens satisfies the following formula:

$$2.9 < \beta_{3T}/\beta_{3W} < 8$$

wherein β_{3T} is a paraxial lateral magnification of the third lens group on the condition that the zoom lens is structured to effect the longest length, and

β_{3w} is a paraxial lateral magnification of the third lens group on the condition that the zoom lens is structured to effect the shortest focal length.

6. (Canceled) The zoom lens of claim 1, further comprising:

a fourth lens group positioned closer to the image than the third lens group and having a positive refracting power.

7. (Currently amended) The zoom lens of claim [[6]] 21, wherein when the magnification is changed from the shortest focal length to the longest focal length, the fourth lens group is shifted toward the object.

8. (Currently amended) The zoom lens of claim [[7]] 21, wherein the zoom lens satisfies the following formula:

$$0.25 < f_3/f_4 < 0.7$$

where f_3 is a focal length of the third lens group, and

f_4 is a focal length of the fourth lens group.

9. (Canceled) The zoom lens of claim 6, wherein the zoom lens satisfies the following formula:

$$3.3 < \beta_{34T}/\beta_{34W} < 8$$

where β_{34T} is a paraxial lateral magnification of the combination of the third lens group and the fourth lens group on the condition that the zoom lens is structured to effect the longest focal length, and

β_{34W} is a synthesized paraxial lateral magnification of the combination of the third lens group and the fourth lens group on the condition that the zoom lens is structure to effect the shortest focal length.

10. (Original) The zoom lens of claim 1, wherein the zoom lens satisfies the following formula:

$$32° < \omega_W < 50°$$

where ω_W is a half angle of view on the condition that the zoom lens is structured to effect the shortest focal length.

11. (Original) The zoom lens of claim 10, wherein the second lens group comprises three negative lenses and a positive lens arranged in this order from the object.

12. (Original) The zoom lens of claim 11, wherein the zoom lens satisfies the following formula:

$$1.5 < f_1/f_w < 20$$

where f_1 is a focal length of the first lens group, and

f_w is the shortest focal length of the zoom lens.

13. (Original) The zoom lens of claim 1, further comprising:

an aperture stop, wherein when the magnification is changed from the shortest focal length to the longest focal length, an aperture diameter of the aperture stop becomes larger.

14. (Original) The zoom lens of claim 13, wherein the aperture stop is provided between the second lens group and the third lens group.

15. (Original) The zoom lens of claim 1, wherein when the magnification is changed from the shortest focal length to the longest focal length, the first lens group is shifted toward the object once after shifted toward the image.

16. (Canceled) The zoom lens of claim 1, wherein the third lens group comprises a 3-a lens sub group having a positive refracting power and a 3-b lens sub group having a positive refracting power and the 3-b lens is shifted so as to conduct focusing.

17. (Currently amended) The zoom lens of claim [[16]] 30, wherein the zoom lens satisfies the following formula:

$$0.25 < f_{3\text{-}a}/f_{3\text{-}b} < 0.7$$

where $f_{3\text{-}a}$ is a focal length of the 3-a lens sub group, and

$f_{3\text{-}b}$ a focal length of the 3-b lens sub group.

18. (Currently amended) A video camera, comprising:

an image pick-up element, and

a zoom lens comprising,

a first lens group having a positive refracting power;

a second lens group positioned closer to the image than the first lens group and having a negative refracting power; and

a third lens group positioned closer to the image than the second lens group and having a positive refracting power;

wherein when the magnification is changed from the shortest focal length to the longest focal length, the third lens group is shifted toward the object and the first lens group and the second lens group are shifted in such a manner that a distance between the first lens group and the second lens group is increased and a distance between the second lens group and the third lens group is decreased,

wherein the third lens group comprises at least a single positive lens and at least a single negative lens,

wherein a magnification ratio of the zoom lens is four times or more[[,]] , and

wherein the zoom lens satisfies the following formula:

$$2.9 < \beta_{3T}/\beta_{3W} < 8$$

wherein β_{3T} is a paraxial lateral magnification of the third lens group on the condition that the zoom lens is structured to effect the longest length, and

β_{3W} is a paraxial lateral magnification of the third lens group on the condition that the zoom lens is structured to effect the shortest focal length.

19. (Currently amended) A digital still camera, comprising:

an image pick-up element, and

a zoom lens comprising,

a first lens group having a positive refracting power,

a second lens group positioned closer to the image than the first lens group and having a negative refracting power; and

a third lens group positioned closer to the image than the second lens group and having a positive refracting power;

wherein when the magnification is changed from the shortest focal length to the longest focal length, the third lens group is shifted toward the object and the first lens group and the second lens group are shifted in such a manner that a distance between the first lens group and the second lens group is increased and a distance between the second lens group and the third lens group is decreased,

wherein the third lens group comprises at least a single positive lens and at least a single negative lens,

wherein a magnification ratio of the zoom lens is four times or more[[.]] , and

wherein the zoom lens satisfies the following formula:

$$2.9 < \beta_{3T}/\beta_{3W} < 8$$

wherein β_{3T} is a paraxial lateral magnification of the third lens group on the condition that the zoom lens is structured to effect the longest focal length, and

β_{3W} is a paraxial lateral magnification of the third lens group on the condition that the zoom lens is structured to effect the shortest focal length.

20. (Canceled) The digital still camera 19, wherein the image pick-up element is a CCD or a CMOS each having pixels more than one million.

21. (New) A zoom lens to form an image of an object with variable magnification between a shortest focal length and a longest focal length, comprising:

a first lens group having a positive refracting power;

a second lens group positioned closer to the image than the first lens group and having a negative refracting power;

a third lens group positioned closer to the image than the second lens group and having a positive refracting power; and

a fourth lens group positioned closer to the image than the third lens group and having a positive refracting power.

wherein when the magnification is changed from the shortest focal length to the longest focal length, the third lens group is shifted toward the object and the first lens group and the second lens group are shifted in such a manner that a distance between the first lens group and the second lens group is increased and a distance between the second lens group and the third lens group is decreased,

wherein the third lens group comprises at least a single positive lens and at least a single negative lens,

wherein a variable magnification ratio of the zoom lens is four times or more, and

wherein the zoom lens satisfies the following formula:

$$3.3 < \beta_{34T}/\beta_{34W} < 8$$

where β_{34T} is a paraxial lateral magnification of the combination of the third lens group and the fourth lens group on the condition that the zoom lens is structured to effect the longest focal length, and

β_{34W} is a synthesized paraxial lateral magnification of the combination of the third lens group and the fourth lens group on the condition that the zoom lens is structure to effect the shortest focal length.

22. (New) The zoom lens of claim 21, wherein the first lens group comprises at least a single positive lens and at least a single negative lens.

23. (New) The zoom lens of claim 21, wherein the zoom lens satisfies the following formula:

$$4.5 < f_1/f_w < 20$$

where f_1 is a focal length of the first lens group, and

f_w is the shortest focal length of the zoom lens.

24. (New) The zoom lens of claim 21, wherein the zoom lens satisfies the following formula:

$$32° < \omega_W < 50°$$

where ω_W is a half angle of view on the condition that the zoom lens is structured to effect the shortest focal length.

25. (New) The zoom lens of claim 24, wherein the zoom lens group comprises three negative lenses and a positive lens arranged in this order from the object.

26. (New) The zoom lens of claim 25, wherein the zoom lens satisfies the following formula:

$$1.5 < f_1/f_w < 20$$

where f_1 is a focal length of the first lens group, and

f_w is the shortest focal length of the zoom lens.

27. (New) The zoom lens of claim 21, further comprising:

an aperture stop, wherein when the magnification is changed from the shortest focal length to the longest focal length, an aperture diameter of the aperture stop becomes larger.

28. (New) The zoom lens of claim 27, wherein the aperture stop is provided between the second lens group and the third lens group.

29. (New) The zoom lens of claim 21, wherein when the magnification is changed from the shortest focal length to the longest focal length, the first lens group is shifted toward the object once after shifted toward the image.

30. (New) A zoom lens to form an image of an object with variable magnification between a shortest focal length and a longest focal length, comprising:

a first lens group having a positive refracting power;

a second lens group positioned closer to the image than the first lens group and having a negative refracting power; and

a third lens group positioned closer to the image than the second lens group and having a positive refracting power;

wherein when the magnification is changed from the shortest focal length to the longest focal length, the third lens group is shifted toward the object and the first lens group and the second lens group are shifted in such a manner that a distance between the first lens group and the second lens group is increased and a distance between the second lens group and the third lens group is decreased,

wherein the third lens group comprises at least a single positive lens and at least a single negative lens,

wherein a variable magnification ratio of the zoom lens is four times or more, and

wherein the magnification is changed from the shortest focal length to the longest focal length, the first lens group is shifted toward the object once after shifted toward the image.

31. (New) The zoom lens of claim 30, wherein the first lens group comprises at least a single positive lens and at least a single negative lens.

32. (New) The zoom lens of claim 30, wherein the zoom lens satisfies the following formula:

$$4.5 < f_1/f_w < 20$$

where f_1 is a focal length of the first lens group, and

f_w is the shortest focal length of the zoom lens.

33. (New) The zoom lens of claim 30, wherein the zoom lens satisfies the following formula:

$$32° < \omega_W < 50°$$

where ω_W is a half angle of view on the condition that the zoom lens is structured to effect the shortest focal length.

34. (New) The zoom lens of claim 33, wherein the second lens group comprises three negative lenses and a positive lens arranged in this order from the object.

35. (New) The zoom lens of claim 34, wherein the zoom lens satisfies the following formula:

$$1.5 < f_1/f_w < 20$$

where f_1 is a focal length of the first lens group, and

f_w is the shortest focal length of the zoom lens.

36. (New) The zoom lens of claim 30, further comprising:

an aperture stop, wherein when the magnification is changed from the shortest focal length to the longest focal length, an aperture diameter of the aperture stop becomes larger.

37. (New) The zoom lens of claim 36, wherein the aperture stop is provided between the second lens group and the third lens group.

38. (New) A zoom lens to form an image of an object with variable magnification between a shortest focal length and a longest focal length, comprising:

a first lens group having a positive refracting power;

a second lens group positioned closer to the image than the first lens group and having a negative refracting power; and

a third lens group positioned closer to the image than the second lens group and having a positive refracting power;

wherein when the magnification is changed from the shortest focal length to the longest focal length, the third lens group is shifted toward the object and the first lens group and the second lens group are shifted in such a manner that a distance between the first lens group and the second lens group is increased and a distance between the second lens group and the third lens group is decreased,

wherein the third lens group comprises at least a single positive lens and at least a single negative lens,

wherein a variable magnification ratio of the zoom lens is four times or more, and

wherein the third lens group comprises a 3-a lens sub group having a positive refracting power and a 3-b lens sub group having a positive refracting power and the 3-b lens is shifted so as to conduct focusing.

39. (New) The zoom lens of claim 38, wherein the zoom lens satisfies the following formula:

$$4.5 < f_1/f_w < 20$$

where f_1 is a focal length of the first lens group, and

f_w is the shortest focal length of the zoom lens.

40. (New) The zoom lens of claim 38, wherein the zoom lens satisfies the following formula:

$$32° < \omega_W < 50°$$

where ω_W is a half angle of view on the condition that the zoom lens is structured to effect the shortest focal length.

41. (New) The zoom lens of claim 40, wherein the second lens group comprises three negative lenses and a positive lens arranged in this order from the object.

42. (New) The zoom lens of claim 41, wherein the zoom lens satisfies the following formula:

$$1.5 < f_1/f_w < 20$$

where f_1 is a focal length of the first lens group, and

f_w is the shortest focal length of the zoom lens.

43. (New) The zoom lens of claim 38, further comprising:

an aperture stop, wherein when the magnification is changed from the shortest focal length to the longest focal length, an aperture diameter of the aperture stop becomes larger.

44. (New) The zoom lens of claim 43, wherein the aperture stop is provided between the second lens group and the third lens group.

45. (New) The zoom lens of claim 38, wherein the zoom lens satisfies the following formula:

$$0.25 < f_{3\text{-}a}/f_{3\text{-}b} < 0.7$$

where $f_{3\text{-}a}$ is a focal length of the 3-a lens sub group, and

$f_{3\text{-}b}$ a focal length of the 3-b lens sub group.

46 (New) A video camera, comprising:

an image pick-up element, and

a zoom lens comprising,

a first lens group having a positive refracting power;

a second lens group positioned closer to the image than the first lens group and having a negative refracting power; and

a third lens group positioned closer to the image than the second lens group and having a positive refracting power;

a fourth lens group positioned closer to the image than the third lens group and having a positive refracting power;

wherein when the magnification is changed from the shortest focal length to the longest focal length, the third lens group is shifted toward the object and the first lens group and the second lens group are shifted in such a manner that a distance between

the first lens group and the second lens group is increased and a distance between the second lens group and the third lens group is decreased,

wherein the third lens group comprises at least a single positive lens and at least a single negative lens,

wherein a magnification ratio of the zoom lens is four times or more, and

wherein the zoom lens satisfies the following formula:

$$3.3 < \beta_{34T}/\beta_{34W} < 8$$

where β_{34T} is a paraxial lateral magnification of the combination of the third lens group and the fourth lens group on the condition that the zoom lens is structured to effect the longest focal length, and

β_{34W} is a synthesized paraxial lateral magnification of the combination of the third lens group and the fourth lens group on the condition that the zoom lens is structure to effect the shortest focal length.

47. (New) A digital still camera, comprising:

an image pick-up element, and

a zoom lens comprising,

a first lens group having a positive refracting power;

a second lens group positioned closer to the image than the first lens group and having a negative refracting power;

a third lens group positioned closer to the image than the second lens group and having a positive refracting power; and

a fourth lens group positioned closer to the image than the third lens group and having a positive refracting power;

wherein when the magnification is changed from the shortest focal length to the longest focal length, the third lens group is shifted toward the object and the first lens group and the second lens group are shifted in such a manner that a distance between the first lens group and the second lens group is increased and a distance between the second lens group and the third lens group is decreased,

wherein the third lens group comprises at least a single positive lens and at least a single negative lens,

wherein a magnification ratio of the zoom lens is four times or more, and

wherein the zoom lens satisfies the following formula:

$$3.3 < \beta_{34T}/\beta_{34W} < 8$$

where β_{34T} is a paraxial lateral magnification of the combination of the third lens group and the fourth lens group on the condition that the zoom lens is structured to effect the longest focal length, and

β_{34W} is a synthesized paraxial lateral magnification of the combination of the third lens group and the fourth lens group on the condition that the zoom lens is structure to effect the shortest focal length.